

CLAIMS.  

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- 1.- Method for echo cancelling in a communication line  
5 system, characterised in that said method is performed by  
adapting tunable passive elements of a hybrid (5) which  
forms part of the analog front end of said communications  
line system, whereby the values of the tunable passive  
elements are controlled by digital control means (4).
- 10 2.- Method according to claim 1, characterised in that a  
scaling factor (k) is used for adapting said tunable  
passive elements.
- 15 3.- Method according to claim 1, characterised in that  
adapting said tunable passive elements comprises a step  
of measuring the TX return loss gain in said hybrid (5),  
whereby, when this gain differs from zero, the digital  
control means (4) goes through a loop of adaptation of  
20 the tunable passive elements until this zero value of  
said TX return loss gain is obtained.
- 4.- Method according to claims 2 and 3, characterised in  
that said hybrid (5) comprises a hybrid bridge (13) with  
25 two branches (19), each comprising two tunable passive  
impedances ( $Z_2$  and  $Z_b$ ) in series, one of which being a  
tunable balance impedance ( $Z_b$ ), said tunable passive  
impedances being tuned such that the value of said  
tunable balance impedance ( $Z_b$ ) approximates as close as  
30 possible the scaled impedance value of the parallel

circuit of the line termination resistance ( $2R_t/2n^2$ ) in the TX paths, and the line impedance ( $Z_{tr+li}$ ).

5 5.- Method according to claim 4, characterised in that said hybrid (5) comprises a current to voltage converter (14), the feedback impedances ( $Z_{fb}$ ) of which being adapted so as to be equal to said tunable balance impedance ( $Z_b$ ).

10 6.- Device for echo cancelling in a communication line system, characterised in that it comprises:  
- a hybrid (5), being part of the analog front end of said communication line system, said hybrid (5) comprising tunable passive elements, the values of which  
15 are controllable, by a  
- digital control means (4) coupled to said hybrid (5) and also included in said device.

20 7.- Device according to claim 6, characterised in that said tunable passive elements of said hybrid (5) are scalable by a predetermined scaling factor ( $k$ ).

25 8.- Device according to claim 6, characterised in that said hybrid (5) comprises a hybrid bridge (13) and a current to voltage converter (14).

9.- Device according to claim 8, characterised in that said hybrid bridge (13) comprises two identical branches (19), each comprising a tunable balance impedance ( $Z_b$ ) in  
30 series with a second tunable impedance ( $Z_2$ ).

10.- Device according to claim 9, characterised in that said tunable balance impedance ( $Z_b$ ) comprises a tunable resistor ( $R_0$ ), in parallel with a series connection of a tunable resistor ( $R_1$ ) and a tunable capacitor ( $C_1$ ), and  
5 in parallel with another resistor ( $R_3$ ).

11.- Device according to claim 10, characterised in that said another resistor ( $R_3$ ) has the same resistance value ( $2kR_t/2n^2$ ), as the line termination resistors (12) in the  
10 TX paths, scaled with said scaling factor ( $k$ ).

12. Device according to claim 9, characterised in that said second tunable impedance ( $Z_2$ ) in each branch (19) comprises a resistor ( $R_2$ ) in series with a tunable  
15 capacitor ( $C_2$ ), the value ( $2kR_t/2n^2$ ) of said resistor ( $R_2$ ) being the same as the resistance value of said line termination resistors (12) in the TX paths, scaled with said scaling factor ( $k$ ).

20 13.- Device according to claim 9, characterised in that said current to voltage converter (14) comprises an operational amplifier (20) with tunable feedback impedances ( $Z_{fb}$ ) having the same impedance values as said tunable balance impedance ( $Z_b$ ).

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14.- Device according to claim 6, characterised in that said digital control means comprises a microprocessor (4).

15.- Device according to claim 6, characterised in that said tunable passive elements are part of an integrated circuit.